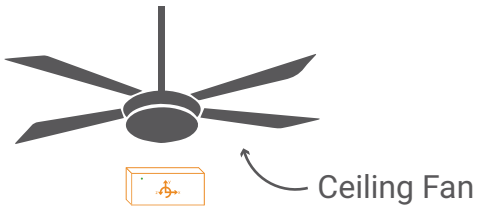
Ceiling Fan in Winter

Exploration

When it is cold outside, it is often thought that fans aren't needed. However, it may be that a fan can bring warm air near the ceiling down to floor level, increasing comfort without raising the thermostat. Energy could therefore be saved.

Materials

- PocketLab
- At least 1 ceiling fan

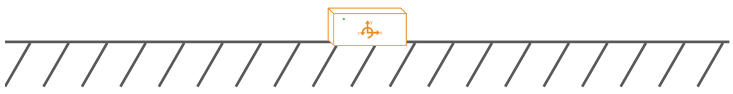


Objective

In this experiment, students will:

1) Determine how a ceiling fan affects the temperature in a room, both near the floor and near the ceiling.

Method



Conduct steps 1-4 with the fan off.

1. Find a way to position the PocketLab near the ceiling, let the PocketLab temperature settle, and record the temperature for 1 minute at 1 reading/second.
2. Place the PocketLab near the floor, let the PocketLab temperature settle, and record the temperature for 1 minute at 1 reading/second.
3. Place PocketLab at around 5 feet above the floor, let the PocketLab temperature settle, and record the tem-

perature for 1 minute at 1 reading/second.

4. Repeat steps 1, 2, and 3 every 15 minutes for an hour.
5. Find the average temperature for each position of the PocketLab in the room.
6. Turn the ceiling fan on, blowing upward.
7. Repeat steps 1-5.

Predictions/Hypothesize

- How do you think the ceiling fan will affect the temperature near the floor? What about near the ceiling?

Data Analysis and Observations/Conclusions

- Did you feel a difference between when the ceiling fan was off versus on?
- Analyze the graphs and the average temperatures to explain how the temperature changed when the fan was turned on.
- Did the temperature change at floor level, 5 feet, or ceiling level? Did they change in different ways?
- What conclusion can you draw about running a ceiling fan in the winter?
- Explain why the ceiling fan needed to blow upward for this experiment. Try to use data to support your answer. Would it make a difference if it blew the other way?